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GAINS IN LIFE EXPECTANCY IN CANADA ON ELIMINATION OF CERTAIN CAUSES OF DEATH, 1978-1983

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Abstract

Estimates of gains in life expectancy at birth and selected ages for Canadian males and females are presented on the assumption of complete elimination of the major causes of death. The study period is 1978 - 1983. The results presented here are an update of an earlier study by Cheung, Kapoor, Ng, Lalu and Krishnan for 1975 - 1977. These results show that heart diseases have dwindled in their importance relative to cancer over this period, even though heart diseases are still the biggest killers with cancer ranking next. While the life expectancy at birth increases by some eight to ten years on the elimination of cardiac diseases, the elimination of cancer adds only three more years to the expectancy at birth.

Key Words: Multiple decrement analysis, major causes of death, Canada

Introduction

The health impact of various diseases upon human life expectancy has always been of great interest to mortality analysts. The technique of multiple decrement analysis is widely used for this purpose. By eliminating hypothetically one or more causes of death, the multiple decrement life tables provides revised life expectancy estimates. The differences observed between the estimates of life expectancy with and without causes of death elimination would then reveal the effect of the specific causes of death under consideration. If a time series of cause-eliminated life expectancy is available, useful information on the performance of the health care system, the ongoing technological advancements in medicine, and the influence of life style on mortality can be obtained.

The method of multiple decrement life table has been critized for relying on the assumption of independence among causes of death. To make life expectancy estimates more reliable, modifications have been made in the formulation of the probability of dying[1,2] This methodology is also critized on the ground that it is not biologically feasible. This is especially true when dealing with degenerative diseases such as heart diseases and malignant neoplasms. The elimination of these major causes of death is deemed

difficult, if not impossible. In this regard, a delayed mortality model has been suggested when preparing life tables for chronic diseases.[3]

Though life expectancy estimates by the cause elimination methodology may not be as realistic as those from the delayed model, they still offer the first approximation of the detrimental effect of specific diseases on health. Previous work by Preston and others[4] well demonstrates the value of such an approach. In the Canadian context, life tables by causes of death are rather scarce. An earlier study by Silins and Zayachowski [5] has provided estimates in gains in life expectancy using 1960-62 data. Similiar estimates for later periods are presented by Smith [6] and Kayani [7] for Alberta, and by Dufour and Peron [8] and Gauthier [9] for Quebec.

A more recent analysis by Cheung et al.[10] prepares life tables by causes of death for Canada from 1975 to 1977. The study reports substantial gains in life expectancy of about 14 years for females, and 10 years for males, if heart diseases are eliminated. When cancer is removed, the increases are three and four years for males and females respectively. Marginal but still noticeable gains in life expectancy are also reported when suicide and accidents are removed as causes of death.

The life tables prepared by Cheung et al.[11] are only for 1975 through 1977. This study is aimed at updating those life tables. Heart diseases, cancer, suicide, and accidents are the causes of death that are eliminated. The results from this study in conjunction with earlier ones can throw light on the changing trend in life expectancy gains by selected causes of death.

Data and Findings

It is known that the major causes of death in Canada are heart diseases, cancer, accidents and suicide. Data required for this study are age-, sex-, cause-specific death rates. All the required informations are retreived from the vital statistics publications of Statistics Canada for 1978 through 1983. In order to smooth out annual fluctuations, averaging was done for the period 1978-1980, and 1981-1983. The algorithm used to calculate the probabilities of dying follow that being discussed in Cheung et al.[12] The computer package employed here to set up the tables is a revised version of the program developed by Lalu. [13] Unlike the study by Cheung et al.[14] which includes all forms of heart diseases, hypertension without heart involvement, phlebitis and the "all other" category have been excluded in the present analysis. Therefore, a slightly reduced gain in life

expectancy is observed, when the cause elimination is performed.

Gains in life expectancy at selected ages after cause elimination are indicated in Table 1 and 2. Detailed life tables are available from the authors on request. The results show that there are improvements in heart diseases for both males and females. However, males have gained more years of life than females. In 1978-1980, the elimination of heart diseases increases life expectancy at birth by 10.2 years for females, and 8.6 years for males. The gains are 9.8 and 7.8 years for females and males respectively in 1981-1983. From these figures, it seems that not only have the males reduced risk of heart disease fatalities, but also their rate of improvement is better than that of the females. The overall trend of progress is rather encouraging if one compares the present results with gains of 11.4 and 12.9 years noted by Silins and Zayachkowski [8] for males and females in 1960-62.

In the case of cancer, the situation is not that bright. The gains in male life expectancy on elimination of cancer increases from 2.3 years in 1960-62 [6], through 2.8 in 1975-1977 [7], and to 3.1 in 1978-80. For 1981-83, the figure is seen as 3.2. For females, the gains at birth in 1981-83 are 3.4 years as compared to 2.6 years in 1960-62

''. These gains in life expectancy indicate the strengthening of the role of cancer on mortality. One point is noteworthy, namely that the gains in life expectancy are higher for females prior to age 40, and higher for males afterwards. Such a pattern reflects the age-sex selection of cancer when claiming its victims; that is, more female than male deaths before the middle age.

Suicide and accidents display different trends in changes over time. For females, the gain in life expectancy on removing suicide has remained more or less unchanged. However, a slight increase is noted for males. It is interesting to note that elimination of accidents has not produced any large gains in life expectancy for both sexes in 1978-80 and 1981-83. In fact, a decreasing trend is observed over the past years. Nevertheless, males still enjoy greater increase than females when accidents are removed from the scene. In other words, accidents are still a more important cause of death among males than females.

Conclusion

This paper has prepared life table by causes of death for Canada in 1978-80 and 1981-83. Four leading causes of death are eliminated one at a time to set up new life tables. It is seen that heart diseases have generally

dwindled in their health impact. One may guess that this may be the result of the new "fitness" and prevention atmosphere that is prevalent in this country. Unfortunately, cancer is seen as a more crucial disease. The impact of suicide has remained more or less constant over time, and accidents have have shown a decline.

Table 1. Gains in Male Life Expectancy In Years At Selected Ages After Elimination Of Certain Causes of Death, Canada, 1978-1980, 1981-1983.

	1978-1980			
	Cause Eliminated			
Age	Heart Disease	Cancer	Suicide	Accidents
0	8.59	3.05	0.50	1.64
20	8.79	3.06	0.45	1.15
30	8.92	3.07	0.30	0.72
40	8.92	3.02	0.19	0.50
50	8.74	2.88	0.11	0.33
60	8.25	2.43	0.06	0.22
70	7.47	1.73	0.02	0.15
	1981-1983			
0	7.82	3.22	0.52	1.36
20	7.97	3.22	0.46	0.97
30	8.05	3.22	0.31	0.61
40	8.06	3.19	0.21	0.43
50	7.87	3.03	0.12	0.29
60	7.43	2.57	0.06	0.19
70	6.68	1.81	0.03	0.13

Table 2. Gains in Female Life Expectancy In Years At Selected Ages After Elimination Of Certain Causes of Death, Canada, 1978-1980, 1981-1983.

	1978-1980			
	Cause Eliminated			
Age	Heart Disease	Cancer	Suicide	Accidents
0	10.20	3.26	0.19	0.77
20	10.32	3.25	0.18	0.52
30	10.36	3.24	0.14	0.42
40	10.38	3.13	0.10	0.34
50	10.40	2.84	0.06	0.29
60	10.43	2.25	0.03	0.23
70	10.25	1.52	0.01	0.19
	1981-1983			
0	9.77	3.40	0.18	0.64
20	9.89	3.39	0.18	0.46
30	9.91	3.36	0.14	0.37
40	9.94	3.26	0.10	0.32
50	9.96	2.96	0.06	0.26
60	9.98	2.36	0.02	0.21
70	9.88	1.59	0.01	0.19

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